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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/823,105	04/13/2004	Shunsuke Kobayashi	CU-3682 RJS	4514

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EXAMINER	
HON, SOW FUN	

ART UNIT	PAPER NUMBER
1794	

MAIL DATE	DELIVERY MODE
08/21/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/823,105	KOBAYASHI ET AL.	
	Examiner	Art Unit	
	SOPHIE HON	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 June 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *8-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *8-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 06/08/09 has been entered.

Withdrawn Rejections

2. The 35 U.S.C. 103(a) rejections of claims 8-13 over Yoshikawa in view of Kobayashi, Asano and Fujimura, are withdrawn due to Applicant's amendment dated 06/08/09.

New Rejections

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 8-13 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter

which does not appear to have been described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Independent claim 1 recites the new limitation of "wherein the matrix liquid crystal, in which the liquid crystal-soluble particles are dissolved or dispersed, shows an electro-optical response such that a voltage at which the matrix liquid crystal starts its response changes depending on a frequency of applied electric field". It appears to be saying that the frequency of the applied electric field controls the voltage at which the liquid crystal matrix starts its response. Applicant is respectfully requested to cite the appropriate section of the specification which provides support for this new limitation, and to accompany it with the appropriate clarification.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 8-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshikawa (Frequency Modulation Response of a Tunable Birefringent Mode Nematic Liquid Crystal Electrooptic Device Fabricated by Doping Nanoparticles of Pd Covered with Liquid-Crystal Molecules, Japan Journal of Applied Physics, vol. 41) in view of Brantingham (US 4,370,647) and Asano (US 4,909,605).

Regarding claim 8, Yoshikawa teaches liquid crystal-soluble particles dissolved or dispersed in a matrix liquid crystal in the liquid crystal layer of a liquid crystal device

element (liquid-crystal EO device, using a liquid crystal as a host medium called NLC1, where the device is doped with PD nano-particles that are covered with other NLC molecules, L1315a, 2nd paragraph), wherein each of the liquid crystal-soluble particles comprises a core having a diameter of 2.5 nm (page L1315a, 3rd paragraph), which is within the range of smaller than 100 nm, which comprises a plurality of nanoparticles; and a protective layer comprising liquid crystal molecules is provided on the periphery of the core (core metal nanoparticles, page L1315a, 3rd paragraph), which renders the particle liquid-crystal soluble. Yoshikawa teaches that the liquid crystal device element is a liquid crystal display device element (page L1315a, 2nd paragraph), but fails to disclose that it comprises the basic components of: a liquid crystal layer formed between a pair of parallel substrates and conductive layers provided respectively on facing inner surfaces of these substrates; and the common components of a pair of liquid crystal alignment layers provided respectively with pre-tilt angle on facing inner surfaces of the conductive layers; wherein the liquid crystal layer is formed between the pair of liquid crystal alignment layers.

However, Brantingham teaches that a typical liquid crystal display device element comprises a liquid crystal layer formed between a pair of parallel substrates and conductive layers provided respectively on facing inner surfaces of these substrates (electrodes 13a and 13b, respectively are disposed on opposing inner major surfaces of substrates 12a and 12b, column 4, lines 29-35). Brantingham teaches that a pair of liquid crystal alignment layers are provided on facing inner surfaces of the conductive layers wherein the liquid crystal layer is formed between the pair of liquid crystal

alignment layers (15 are disposed inwardly for aligning liquid crystal molecules of liquid crystal material 11, column 4, lines 45-50, Fig. 1).

Asano teaches that the liquid crystal layer in a typical liquid crystal display device element is commonly aligned between a pair of liquid crystal alignment layers provided respectively on facing inner surfaces of a pair of parallel substrates (pair of substrates each having an alignment layer, column 2, lines 43-47) wherein the liquid crystal alignment layers have a pre-tilt angle (column 3, lines 1-2), for the purpose of providing the desired pre-tilt angle to the liquid crystal (column 5, lines 43-50).

Therefore, since Yoshikawa is silent regarding the components of the liquid crystal display device element, it would have been necessary and hence obvious to have looked to the prior art for suitable ones. As such, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have formed the liquid crystal device element of Yoshikawa, by disposing the liquid crystal layer containing the liquid crystal-soluble metal core particles, in between a pair of liquid crystal alignment layers formed on the facing inner surfaces of a pair of conductive layers which are provided on the inner surfaces of a pair of parallel substrates, as taught by Brantingham, wherein the liquid crystal alignment layers are provided respectively with a pre-tilt angle, in order to align the liquid crystal layer with the desired pre-tilt angle, as taught by Asano.

In addition, Yoshikawa teaches that the matrix liquid crystal, in which the liquid crystal-soluble particles are dissolved or dispersed, shows an electro-optical response such that a voltage at which the matrix liquid crystal starts its response changes

depending on a frequency of the applied electric field (Fig. 2. Electrooptic characteristics of the FM-TB-mode NLC devices with 1 wt.% of Pd nanoparticles taking the frequency as a parameter, L1316a, 1st paragraph). Yoshikawa teaches that voltage is applied across the electrodes of a pixel while modulating at least the frequency (drive this device by changing the frequency of the applied voltage across the electrodes of a pixel, L1317b, 1st paragraph), wherein the matrix liquid crystal, in which the liquid crystal-soluble particles are dissolved or dispersed, shows an electro-optical response such that a voltage at which the matrix liquid crystal starts its response changes depending on a frequency (Fig. 2. Electrooptic characteristics of the FM-TB-mode NLC devices with 1 wt.% of Pd nanoparticles taking the frequency as a parameter, L1316a, 1st paragraph), which indicates the presence of a control circuit for applying voltage while modulating the frequency, provided on the conductive layer for varying light transmittance of the liquid crystal layer, as evidenced by Brantingham.

Brantingham teaches that a typical liquid crystal display device element has a control circuit that applies voltage, while modulating at least the frequency (multiplexed drive system for effecting frequency switching, high frequency generator 30 supplies high frequency square wave signals alternating between zero volts and + V volts, column 8, lines 36-51), is provided on the conductive layer for varying light transmittance of the liquid crystal layer (electro-optic response of the display is controllable by adjusting the drive frequency, column 5, lines 60-65).

Furthermore, Yoshikawa teaches that under a constant applied voltage, an electro-optical response of the liquid crystal display element is turned on and off by

switching the frequency of the applied electric field (drive this device by changing the frequency of the applied voltage across the electrodes without changing the amplitude, page L1317b, 1st paragraph). Yoshikawa fails to specify that the electro-optical response is turned on by switching the frequency of the applied electric field from low frequency to high frequency, and turned off by switching the frequency from high frequency to low frequency.

However, when the electro-optical response of the liquid crystal display element is turned on and off by switching the frequency of the applied electric field, there are only two possible options: the first option being the combination of on/low frequency and off/high frequency; the second option being the combination of off/low frequency and on/high frequency option, where the second option is a viable option, as evidenced by Brantingham.

Brantingham teaches that an electro-optical response of the liquid crystal layer of a liquid crystal device element can be, when under a constant applied voltage, turned on by switching the frequency of the applied electric field from low frequency to high frequency, and that the electro-optical response is then turned off by switching the frequency from high frequency to low frequency (F*on* is greater than the resultant frequency of the corresponding signal applied to the OFF segment, F*off* ... Thus individual segments can be turned on and off by varying the frequency, column 6, lines 15-25).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have turned on the electro-optical response of the liquid

crystal device element of Yoshikawa by switching the frequency of the applied electric field from low frequency to high frequency, and to have turned it off by switching the frequency from high frequency to low frequency, in order to provide the desired display characteristics, as taught by Brantingham.

Regarding claim 9, although Yoshikawa is silent regarding a value for a time constant of response concerning turning the electro-optical response on and off, near-instantaneous response is most commonly preferred, which overlaps the claimed range of 0.1 ms to 10 ms, for the purpose of providing the desired real-time image.

Regarding claim 10, Yoshikawa teaches that the frequency modulation range of the electro-optical response is in a range of 20 Hz to 120 Hz (L1317b, 1st paragraph), that is within the claimed range of 20 Hz to 100 kHz.

Regarding claim 11, Yoshikawa teaches that the nanoparticle constituting the liquid crystal-soluble particle is at least one kind of metal atom selected from Pd (page L1315a, 2nd paragraph).

Regarding claim 12, Yoshikawa teaches that the liquid crystal device element is driven by using an active matrix mode (matrix driving, L1317b, 1st paragraph).

Regarding claim 13, Yoshikawa discloses in Fig. 1(c) (L1315b), shown on the next page, that the short axis width of the liquid crystal molecule is equal to or less than the diameter of the core.

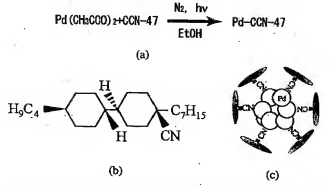

Fig. 1. Synthesising process of Pd-CCN-47 using an alcohol reduction method, where (a) is a chemical equation showing the synthesising process of Pd-CCN-47, (b) shows the CCN-47 chemical structure, and (c) illustrates the Pd-CCN-47 nanoparticles.

Response to Arguments

5. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication should be directed to Sow-Fun Hon whose telephone number (571)272-1492. The examiner can normally be reached Monday to Friday from 10:00 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Sample, can be reached on (571)272-1376. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Sophie Hon/

Sow-Fun Hon

Examiner, Art Unit 1794